and the radiation levels for such shipment must not exceed the following during transportation:

(1) 2 mSv/h (200 mrem/h) on the external surface of the package, unless the following conditions are met, in which case the limit is 10 mSv/h (1000 mrem/h):

(i) The shipment is made in a closed transport vehicle;

(ii) The package is secured within the vehicle so that its position remains fixed during transportation; and

(iii) There are no loading or unloading operations between the beginning and end of the transportation;

(2) 2 mSv/h (200 mrem/h) at any point on the outer surface of the vehicle, including the top and underside of the vehicle; or in the case of a flat-bed style vehicle, at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load or enclosure, if used, and on the lower external surface of the vehicle; and

(3) 0.1 mSv/h (10 mrem/h) at any point 2 meters (80 in) from the outer lateral surfaces of the vehicle (excluding the top and underside of the vehicle); or in the case of a flat-bed style vehicle, at any point 2 meters (6.6 feet) from the vertical planes projected by the outer edges of the vehicle (excluding the top and underside of the vehicle); and

(4) 0.02 mSv/h (2 mrem/h) in any normally occupied space, except that this provision does not apply to private carriers, if exposed personnel under their control wear radiation dosimetry devices in conformance with 10 CFR 20.1502.

(c) For shipments made under the provisions of paragraph (b) of this section, the shipper shall provide specific written instructions to the carrier for maintenance of the exclusive use shipment controls. The instructions must be included with the shipping paper information.

(d) The written instructions required for exclusive use shipments must be sufficient so that, when followed, they will cause the carrier to avoid actions that will unnecessarily delay delivery or unnecessarily result in increased radiation levels or radiation exposures to transport workers or members of the general public.

§71.51 Additional requirements for Type B packages.

(a) Except as provided in §71.52, a Type B package, in addition to satisfying the requirements of §§71.41 through 71.47, must be designed, constructed, and prepared for shipment so that under the tests specified in:

(1) Section 71.71 (''Normal conditions of transport''), there would be no loss or dispersal of radioactive contents—as demonstrated to a sensitivity of 10^{-6} A_2 per hour, no significant increase in external surface radiation levels, and no substantial reduction in the effectiveness of the packaging; and

(2) Section 71.73 (''Hypothetical accident conditions''), there would be no escape of krypton-85 exceeding 10 A_2 in 1 week, no escape of other radioactive material exceeding a total amount A_2 in 1 week, and no external radiation dose rate exceeding 10 mSv/h (1 rem/h) at 1 m (40 in) from the external surface of the package.

(b) Where mixtures of different radionuclides are present, the provisions of appendix A, paragraph IV of this part shall apply, except that for Krypton-85, an effective A_2 value equal to 10 A_2 may be used.

(c) Compliance with the permitted activity release limits of paragraph (a) of this section may not depend on filters or on a mechanical cooling system.

§71.53 Fissile material exemptions.

Fissile materials meeting the requirements of one of the paragraphs in (a) through (d) of this section are exempt from fissile material classification and from the fissile material package standards of §§71.55 and 71.59, but are subject to all other requirements of this part. These exemptions apply only when beryllium, graphite, or hydrogenous material enriched in deuterium is not present in quantities exceeding 0.1 percent of the fissile material mass.

(a) Fissile material such that

$$\frac{\text{grams of uranium} - 235}{X} + \frac{\text{grams of other fissile material}}{Y} \leq 1$$

for an individual consignment, where X and Y are the mass limits defined in table following paragraph (a)(3) of this section, provided that:

(1) Each package contains no more than 15 g of fissile material. For unpackaged material the mass limit of 15g applies to the conveyance; or

(2) The fissile material consists of a homogeneous hydrogenous solution or mixture where the minimum ratio of hydrogen atoms to fissile radionuclide atoms (H/X) is 5200 and the maximum concentration of fissile radionuclides within a package is 5 g/liter; or

(3) There is no more than 5g of fissile material in any 10 liter volume of material and the material is packaged so as to maintain this limit of fissile radionuclide concentration during normal transport.

THE REQUIREMENTS FOR PACKAGES CONTAINING FISSILE MATERIAL

Fissile material	Fissile material mass (g) mixed with substances having an average hydrogen density less than or equal to water	Fissile material mass (g) mixed with substances having an average hydrogen density greater than water
Uranium-235(X)	400	290
1Other fissile material(Y)	250	180

(b) Uranium enriched in uranium-235 to a maximum of 1 percent by weight, and with total plutonium and uranium-233 content of up to 1 percent of the mass of uranium-235, provided that the fissile material is distributed homogeneously throughout the package contents and does not form a lattice arrangement within the package.

(c) Liquid solutions of uranyl nitrate enriched in uranium-235 to a maximum of 2 percent by weight, with a total plutonium and uranium-233 content not exceeding 0.1 percent of the mass of uranium-235, and with a minimum nitrogen to uranium atomic ratio (N/U) of 2.

(d) Plutonium, less than 1 kg, of which not more than 20 percent by mass may consist of plutonium-239, plutonium-241, or any combination of these radionuclides.

[62 FR 5913, Feb. 10, 1997]

§ 71.55 General requirements for fissile material packages.

(a) A package used for the shipment of fissile material must be designed and constructed in accordance with §§ 71.41 through 71.47. When required by the total amount of radioactive material, a package used for the shipment of fissile material must also be designed and constructed in accordance with § 71.51.

(b) Except as provided in paragraph (c) of this section, a package used for the shipment of fissile material must be so designed and constructed and its contents so limited that it would be subcritical if water were to leak into the containment system, or liquid contents were to leak out of the containment system so that, under the following conditions, maximum reactivity of the fissile material would be attained:

(1) The most reactive credible configuration consistent with the chemical and physical form of the material;

(2) Moderation by water to the most reactive credible extent; and

(3) Close full reflection of the containment system by water on all sides, or such greater reflection of the containment system as may additionally be provided by the surrounding material of the packaging.